CS231n Project Design

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Agenda

1. Project expectations
    a. Does my project meet expectations?
    b. FAQs
2. Picking a project idea
    a. Sources of inspiration
    b. Reading papers efficiently
3. Proposal, milestone, and final report
    a. Due dates, expectations, logistics
    b. Support

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Project expectations

The course project is a (fun) way to explore concepts taught in the course on a topic of your choice!

- Fairly open-ended, anything related to vision (**link to project page**)

Completed in groups of 1, 2, or 3 people

- Project expectations are higher for groups with more people

Generally, two tracks of work:

- **Applications:** If you have a specific background or interest (e.g. biology, engineering, physics), we'd love to see you apply ConvNets to problems related to your particular domain of interest.

- **Models:** You can build a new model (algorithm) and apply it to tackle vision tasks. This track might be more challenging, and may later lead to a piece of publishable work.

Project expectations

The final report has the following structure:

- Title, Author(s)
- Abstract
- Related Work
- Data Description
- Methods
- Experiments
- Conclusion
- Supplementary Material (optional)

For more on each of these, please also refer to the "final report" part of the **project page** (http://cs231n.stanford.edu/project.html#report)

FAQ: Does my project meet expectations?

Rule of thumb:

- How much effort are you putting into your project?

Strong projects might...

- Propose a novel variant of a technique (which takes a lot of effort)

- Adapt an existing technique to a totally new problem (which takes a lot of effort)

Weaker projects might...

- Spend several weeks collecting/cleaning data rather than testing hypotheses

- Clone an existing repo and do minimal stitching to make it work for a Kaggle competition

FAQ: Does my project meet expectations?

So, this **doesn't** mean:

- Your project has to be strictly novel to get a good grade (although, we encourage this!)
- You have to beat the state-of-the-art performance to get a good grade (you don't have to come up with the next best object detector to test an interesting hypothesis)

This **does** mean:

- You need to put a significant effort into your investigation, and you may have to try many different approaches

In your **analysis**, ask yourself:

- Are you *interpreting* and *understanding* your results, or merely stating them?
- Are you just plotting a loss curve, or are you evaluating the results of your approach from many different angles?

Project FAQs

Q: Can I apply convolutional networks to a purely NLP / audio / stock price problem?

- **A:** This is a computer vision course, so ***you must incorporate visual data in some form***.

Q: Can I change my project after the proposal, before the milestone?

- **A:** Yes - the proposal is to make sure you have a plausible project direction. If you need to change project directions, we understand.

Q: Can I change my project ***after*** the milestone?

- **A:** In general, we do not encourage this. At this point in the course, there will be little time to put together a sufficient project.

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Picking a project idea

First and foremost:

Do what is important or interesting to you, *not* what seems easiest.

- You will be far more motivated if you're invested in what you're doing
- What do you *really* care about? Healthcare? Self-driving cars? Surveillance? Sports? Ethics? You can probably find its intersection with computer vision

Practical considerations:

1. **Data:** Is there existing data for this problem? Will I need to spend weeks collecting it myself?

2. **Code & framework:** Will I have to implement this myself, or is there an existing implementation?

Picking a project idea

Conferences:

CVPR: IEEE Conference on Computer Vision and Pattern Recognition

ICCV: International Conference on Computer Vision

ECCV: European Conference on Computer Vision

NeurIPS: Neural Information Processing Systems

ICLR: International Conference on Learning Representations

ICML: International Conference on Machine Learning

*Note: Do **not** even begin to try to read through all of these papers, or even their titles. There are far too many. Use CMD+F to find papers with relevant keywords.*

Picking a project idea

Additional resources:

- Stanford Vision Lab Publications

- Awesome Deep Vision

- Papers With Code

- Kaggle

- Previous CS229 Projects

Reading papers

Do **not** read a paper linearly on your first pass

- First, read the abstract (word for word) as well as the figures & captions

- Does the paper still seem relevant? If so, read the methods as well as the results

- Finally, read the entire paper linearly (if the additional detail seems useful)

Papers are not always the most efficient way to digest an idea. Also try looking around for:

- Talks, videos, or blog posts on the topics

- Github repos, containing actual code for the idea

Reading papers

Example:

You Only Look Once:
Unified, Real-Time Object Detection

Joseph Redmon*, Santosh Divvala*†, Ross Girshick¶, Ali Farhadi*†
University of Washington*, Allen Institute for AI†, Facebook AI Research¶
http://pjreddie.com/yolo/

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Deliverables

Due dates:

- Proposal (4/18) - Monday!
- Milestone (5/7)
- Final report (6/2)
- Poster session (6/4)

Project Proposal (Due 4/18)

The proposal is a 200-400 word paragraph answering the following questions:

- **Problem**: What is the problem that you will be investigating? Why is it interesting?
- **Background**: What reading will you examine to provide context/background?
- **Data**: What data will you use?
    - If you are collecting new data, how will you do it?
- **Method**: What method or algorithm are you proposing?
    - If there are existing implementations, will you use them and how?
    - How do you plan to improve or modify such implementations?
- **Results**: How will you evaluate your results?
    - Qualitatively, what kind of results do you expect (e.g. plots or figures)?
    - Quantitatively, what kind of metrics will you use to evaluate/compare your results?

Milestone (Due 5/7)

At most 3-page progress report, more or less containing:

1. **Literature review (3+ sources)**
2. **Indication that code is up and running**
3. Data source explained correctly
4. What Github repo or other code you're basing your work off of
5. **Ran baseline model have results**
    a. Yes, points are taken off for no model running & no preliminary results
6. Data pipeline should be in place
7. Brief discussion of your preliminary results

Support: CA areas of specialty

Day	Staff			
Mon	**Drew** *GANs, NLP*	**Yinan** *GANs, 3D vision, inverse graphics*	**Zhuoyi** *Object detection, scene graph generation, activity parsing; health care*	
Tue	**Mihir** *Autonomy, multi-object tracking, 3D vision, robotics (social navigation)*	**Manasi** *Image classification, image augmentation, 3D vision; astrophysics*	**Stephen** *Video understanding, action recognition, medical imaging, multi-task learning; healthcare*	**Dhruva** *CV, RL, NLP*
Wed	**Agrim** *RL, videos, detection; robotics, autonomous vehicles*	**Manasi** *Image classification, image augmentation, 3D vision; astrophysics*	**William** *3D vision, robot learning*	**Gokul** *RL, robot learning, simulation; robotics, autonomous vehicles*
Thu	**Shyamal** *Videos, vision+language*	**Bohan** *Robot learning; robotics*	**Dhruva** *CV, RL, NLP*	**Yinan** *GANs, 3D vision, inverse graphics*
Fri	**Agrim** *RL, videos, detection; robotics, autonomous vehicles*	**Moo Jin** *Robot learning, RL; robotics*	**Stephen** *Video understanding, action recognition, medical imaging, multi-task learning; healthcare*	**Sumith** *Video ML, human motion (sports/exercises)*
Sat	**Hongyu** *Graph neural networks*	**Bohan** *Robot learning; robotics*		
Sun	**Haochen** *Robot learning; robotics*	**Bohan** *Robot learning; robotics*		

Questions?